WE CLAIM:

1. An optical fiber, comprising:

a photosensitive core comprising a concentration of a first material that increases the refractive index of the core and a concentration of a second material that is other than boron and that reduces the refractive index of the core;

a cladding disposed about the core for tending to confine light to the core; and

at least one longitudinally extending region having a thermal coefficient of expansion (TCE) that is different from the TCE of the cladding whereby the optical fiber is photosensitive and birefringent.

2. The optical fiber of claim 1, wherein the at least one longitudinally extending region comprises at least one pair of longitudinally extending regions disposed in diametrically opposed portions of the cladding and spaced from the core.

3. The optical fiber of claim 1 further comprising an index grating.

4. The optical fiber of claim 1 wherein the core comprises silicon dioxide (SiO_2), the first material comprises germanium and the second material comprises fluorine (F).

5. The optical fiber of claim 1 wherein the core consists essentially of silicon dioxide (SiO_2), fluorine (F) and at least one oxide of germanium.

6. The optical fiber of claim 1 wherein the core consists essentially of silicon dioxide (SiO_2) doped with a concentration of germanium dioxide (GeO_2) of

at least about 10% by weight and a concentration of fluorine of at least about 0.1% by weight.

7. The optical fiber of claim 4 wherein the concentration of germanium dioxide (GeO_2) is at least about 10.0% by weight and the concentration of fluorine (F) is at least about 0.1% by weight.

8. The optical fiber of claim 4 wherein the concentration of germanium dioxide (GeO_2) is from about 10.0% by weight to about 40.0% by weight.

9. The optical fiber of claim 4 wherein the concentration of fluorine (F) is from about 0.1% by weight to about 5.0% by weight.

10. The optical fiber of claim 4 wherein the concentration of germanium dioxide (GeO_2) is from about 10.0% by weight to about 20.0% by weight.

11. The optical fiber of claim 4 wherein the concentration of fluorine (F) is from about 0.2% by weight to about 3.0% by weight.

12. The optical fiber of claim 1 wherein the core comprises silicon dioxide (SiO_2) and at least one of the first material and the second material comprises at least one element selected from the group consisting of germanium (Ge), tin (Sn), cerium (Ce) and tantallum (Ta).

13. The optical fiber of claim 2 wherein the longitudinally extending regions each have a generally circular outer perimeter.

14. The optical fiber of claim 1 wherein the fiber has a polarization beat length of less than 25 mm at a wavelength of 1550 nm.

15. The optical fiber of claim 1 wherein the optical fiber has a second mode cutoff wavelength of less than 1800 nanometers.

16. The optical fiber of claim 1 wherein said cladding comprises an index of refraction, and wherein said fiber includes a second cladding disposed about said cladding, said second cladding comprising a second index of refraction that is less than said first index of refraction.

17. The optical fiber of claim 16 wherein the fiber comprises a rare earth.

18. The optical fiber of claim 17 wherein the rare earth comprises ytterbium.

19. The optical fiber of claim 16 wherein the core comprises a numerical aperture of no greater than 0.09.

20. The optical fiber of claim 16 wherein the core of the fiber is multimode and the fiber has a V number of at least 4 at a wavelength of 1550 nm.

21. The optical fiber of claim 16 wherein the core of the fiber is multimode and the fiber has a V number of at least 4 at a wavelength of 1550 nm and wherein the core comprises a numerical aperture of no greater than 0.09.

22. The optical fiber of claim 21 wherein the at least one longitudinally extending region comprises at least one pair of longitudinally extending regions spaced from the core, each of said pair having a generally circular outer perimeter.

23. The optical fiber of claim 16 wherein the core has a diameter of greater than 25 microns.

24. The optical fiber of claim 1 wherein the core comprises a numerical aperture of no greater than 0.09.

25. The optical fiber of claim 1 wherein the core comprises a V number of at least 4 at a wavelength of 1550 nm.

26. The optical fiber of claim 1 wherein the fiber comprises a rare earth.

27. An optical fiber, comprising:

a core comprising silicon dioxide (SiO_2) doped with germanium dioxide (GeO_2) and fluorine (F) and wherein the concentration of germanium dioxide (GeO_2) is from about 10.0% by weight to about 40.0% by weight and the concentration of fluorine (F) is from about 0.1% by weight to about 5% by weight;

a silica cladding disposed in coaxial relationship with the core; and

a plurality of longitudinally extending regions having a generally circular outer perimeter is disposed in diametrically opposed portions of the cladding, the regions being spaced from the core and each of the regions having a thermal coefficient of expansion (TCE) that is different from that of the cladding and each of the regions comprising silicon dioxide (SiO_2) doped with boron trioxide (B_2O_3).

28. An optical fiber, comprising:

a core;

a cladding disposed about the core;

means for applying stress to the core to create birefringence during propagation of light through the optical fiber; and

means for receiving an index grating, the means for receiving an index grating including a concentration of a first material that increases the refractive index of at least one of the core and the cladding and a concentration of

a second material that reduces the refractive index of the one of the core and the cladding, the second material being other than boron.

29. The optical fiber of claim 28 wherein the means for applying stress to the core comprises diametrically opposed longitudinally extending regions, the regions being spaced from the core and each of the regions having a thermal coefficient of expansion that is different from that of the cladding.

30. An optical fiber, comprising:

a photosensitive core comprising a concentration of germanium of at least 10 % by mole and the core being substantially free of a refractive index reducing material;

a cladding disposed about the core for tending to confine light to the core; and

at least one longitudinally extending region having a thermal coefficient of expansion (TCE) that is different from the TCE of the cladding whereby the optical fiber is photosensitive and birefringent.

31. The optical fiber of claim 30 wherein the core comprises a concentration of germanium dioxide (GeO_2) of at least 15 % by mole.

32. The optical fiber of claim 30 wherein the optical fiber has a numerical aperture (NA) of larger than 0.2.

33. A method of making an optical fiber, comprising:

providing a longitudinally extending core member comprising a core index of refraction;

providing a longitudinally extending cladding member having an index of refraction that is less than the core index of refraction;

forming three longitudinally extending apertures in the cladding member, a first of the three apertures being generally centrally located in the cladding member and the other two being disposed diametrically about the first;

providing two longitudinally extending members having a thermal coefficient of expansion (TCE) different from the TCE of the cladding member; and

inserting the core member into the first aperture and the two longitudinally extending members into the remaining apertures of the cladding member thereby forming a preform for drawing a birefringent, photosensitive optical fiber.

34. The method of claim 33 further comprising drawing out an optical fiber from the preform.

35. The method of claim 33 wherein the core member comprises a concentration of germanium dioxide (GeO_2) of at least 8 mole%.

36. The method of claim 33 wherein providing a longitudinally extending core member comprises providing a longitudinally extending core member having a core that has a generally elliptical outer perimeter.

37. The method of claim 33 wherein providing a longitudinally extending core member comprises providing a longitudinally extending core member having a cladding disposed about a core and wherein the cladding has an index of refraction greater than the index of refraction of the core.

38. The method of claim 33 wherein providing a longitudinally extending core member comprises providing a longitudinally extending core member that includes a concentration of germanium and a concentration of boron.

39. The method of claim 38, wherein the core consists essentially of silicon dioxide (SiO_2) doped with oxides of germanium and of boron.

40. The method of claim 38, wherein the concentration of germanium includes a concentration of germanium dioxide (GeO_2) of at least about 7.0% by mole and the concentration of boron includes a concentration of boron trioxide (B_2O_3) of at least about 1.0% by mole.

41. The method of claim 37, wherein providing a longitudinally extending core member comprises providing a longitudinally extending core member having a cladding disposed about a core and removing at least some of cladding from the core member.

42. The method of claim 33, wherein the longitudinally extending members comprise silicon dioxide (SiO_2) doped with one or more materials from the group consisting of germanium dioxide (GeO_2), boron trioxide (B_2O_3), phosphorous pentoxide (P_2O_5) and titanium dioxide (TiO_2).

43. The method of claim 33, wherein the refractive index of the longitudinally extending members substantially matches that of the cladding member.

44. The method of claim 33, wherein forming three longitudinally extending apertures in the cladding member comprises acoustically drilling three longitudinally extending apertures.

45. The method of claim 44, wherein acoustically drilling comprises ultrasound diamond grinding.

46. A polarization-maintaining double-clad optical fiber, comprising:

an axially extending core comprising an active material and an index of refraction;

a first cladding disposed about said core, said first cladding comprising a first index of refraction that is less than said index of refraction comprised by said core, said first cladding further comprising a thermal coefficient of expansion (TCE) and a circular outer perimeter;

a second cladding disposed about said first cladding, said second cladding comprising a second index refraction that is less than said first index of refraction comprised by said first cladding;

a pair of axially extending stress inducing regions constructed and arranged to make said fiber polarization-maintaining, each of said regions having a TCE that is different than said TCE of said first cladding, and each of said regions being circular and being spaced from said core; and

wherein said fiber is constructed and arranged to provide an absorption per unit length that is within 15 percent of a test fiber that is identical to said fiber except that the outer perimeter of the first cladding of the test fiber is shaped as an octagon.

47. A polarization-maintaining double-clad optical fiber, comprising:

an axially extending core comprising an active material and an index of refraction, said active material for, responsive to absorbing pump light, providing light having a wavelength that is different than the wavelength of the pump light;

a first cladding disposed about said core, said first cladding comprising a first index of refraction that is less than said index of refraction comprised by said core, said first cladding further comprising a thermal coefficient of expansion (TCE), said first cladding for receiving the pump light for absorption by said active material;

a second cladding disposed about said first cladding, said second cladding comprising a second index refraction that is less than said first index of refraction comprised by said first cladding;

a pair of axially extending stress inducing regions constructed and arranged to make said fiber polarization-maintaining, each of said regions having a TCE that is different than said TCE of said first cladding, each of said regions being spaced from said core; and

wherein said pair of stress inducing regions can cause sufficient scattering of pump light received by said first cladding such that the absorption of pump light per unit length of said fiber is within 15 percent of at least one of the absorption per unit length when said second cladding has a circular outer perimeter and the absorption per unit length when said second cladding has an outer perimeter shaped as an octagon.

48. The optical fiber of claim 47 wherein said outer perimeter of said second cladding is circular.

49. The optical fiber of claim 47 wherein said outer perimeter of said second cladding is shaped as an octagon.